What is claimed is:

1. An amplifier system that amplifies an input signal comprising:

a first polar amplifier assembly, operative to amplify the input signal to produce an amplified output signal for the system when the system is in a first mode;

a second polar amplifier assembly, operative to amplify the input signal to produce the amplified output signal for the system when the system is in a second mode; and

a mode selector that selects a mode of operation from at least the first and second modes for the amplifier system according to at least one characteristic of the input signal relative to at least one threshold parameter.

2. The system of claim 1, the at least one characteristic of the input signal comprising the amplitude of the input signal envelope.

3. The system of claim 1, the first polar amplifier assembly being fabricated *via* a first fabrication technology having a first set of associated properties, and the second polar amplifier assembly being fabricated *via* a second fabrication technology having a second set of associated properties.

4. The system of claim 3, the first fabrication technology comprising one of Gallium Nitride (GaN) and Laterally Diffused Metal Oxide Semiconductors (LDMOS) and the second fabrication technology comprising one of Gallium Arsenide (GaAs), Indium Phosphide (InP), and Complementary Metal Oxide Semiconductors (CMOS).

5. The system of claim 1, the amplifier system comprising N polar amplifier assemblies, where N is an integer greater than two, the mode selector having N modes to select between which of one of the N polar amplifier assemblies will amplify the input signal.

6. The system of claim 1, the input signal being a phase and/or amplitude modulated signal and the at least one threshold parameters representing respective envelope amplitude levels associated with the input signal, such that the first mode is selected when the input signal envelope amplitude level is greater than a first threshold parameter and the second mode is selected when the input signal envelope amplitude level falls between the first threshold parameter and a second threshold parameter.

7. The system of claim 1, the mode selector providing a digital representation of a reference signal corresponding to a desired amplified output signal to a first summer through a digital-to-analog converter (DAC), the first summer receiving a portion of the power amplifier output through a coupler and providing a cancellation signal to a cancellation amplifier, the amplified cancellation signal being inverted and combined with a delayed version of the amplified output signal through a second summer.

8. The system of claim 7, the cancellation amplifier being a linear amplifier.

9. The system of claim 1, the first and second polar amplifier assemblies comprising respective first and second power amplifiers, each of the first and second power amplifiers having an associated input terminal and an associated supply terminal.

10. The system of claim 9, the first and second power amplifiers being non-linear class type amplifiers.

11. The system of claim 9, the mode selector providing a phase modulated digital input signal to the input terminal of the first power amplifier through a first DAC, and a amplitude modulated digital supply signal to the supply terminal of the first power amplifier through a second DAC and a first modulation amplifier when the system is operating in the first mode, and providing the phase modulated digital input signal to the input terminal of the second power amplifier through a third DAC, and the amplitude modulated digital supply signal to the supply terminal of the second power amplifier

through a fourth DAC and a second modulation amplifier when the system is operating in the second mode.

12. The system of claim 11, at least one of the first, second, third, and fourth DACs being delta-sigma DACs, such that the at least one of the phase modulated digital input signal and the amplitude modulated digital supply signal are converted into the analog domain directly at a desired radio transmission frequency.

13. The system of claim 11, the first modulation amplifier and the second modulation amplifier each being one of a Class-S type and a Class-G type modulator.

14. The system of claim 1, the mode selector providing a reference signal corresponding to a desired output signal of the amplifier system to a digital cross-cancellation assembly, the reference signal being combined with a portion of the amplified output signal to determine a cancellation signal, the cancellation signal being amplified, inverted and combined with a delayed version of the amplified output signal to generate a final output signal.

15. The system of claim 14, the digital cross-cancellation assembly being associated with a third mode, the amplified inverted cancellation signal providing at least a substantial portion of the amplified output signal while the third mode of operation is selected, and the amplified inverted cancellation signal mitigating signal distortion and out-of-band (OOB) emissions associated with the amplified output signal while one of the first and second modes of operation is selected.

16. The system of claim 15, the input signal being a phase and/or amplitude modulated signal and the at least one threshold parameters representing respective envelope amplitude levels associated with the input signal, such that the first mode is selected when the input signal envelope amplitude level is greater than a first threshold parameter, the second mode is selected when the input signal envelope amplitude level falls between the first threshold parameter and a second threshold parameter, and the

third mode is selected when the input signal envelope amplitude level falls below the second threshold parameter.

17. A transmitter comprising the amplifier system of claim 1.

18. A base station comprising the transmitter of claim 17.

19. An amplifier system comprising:

a plurality of power amplifiers, each operative to amplify an input signal to provide an amplified output signal;

respective input paths coupled to respective input terminals of the plurality of power amplifiers;

respective supply paths coupled to respective supply terminals of the plurality of power amplifiers; and

a mode selector that selects one of the plurality of power amplifiers to operate as a polar amplifier based on a characteristic of the input signal relative to at least one threshold parameter.

20. The system of claim 19, further comprising an output arbitrator that produces a unified output signal from respective outputs of the plurality of power amplifiers.

21. The system of claim 20, the output arbitrator comprising at least one summer that sums the outputs of the plurality of power amplifiers.

22. The system of claim 20, the output arbitrator comprising at least one switch that selects between the outputs of the plurality of power amplifiers.

23. The system of claim 20, further comprising a correction path that mitigates signal distortion and out-of-band (OOB) emissions associated with the unified output signal.

24. The system of claim 23, the correction path comprising:

a digital-to-analog converter (DAC) having an input coupled to the mode selector;

a first summer having a first input coupled to an output of the DAC and a second input coupled to an output of the output arbitrator through a coupler;

a cancellation amplifier having an input coupled to an output of the first summer and an output coupled to a second summer, wherein the DAC receives a digital representation of a reference signal corresponding to a desired amplified output signal that is converted into an analog reference signal and combined with a portion of the unified output signal through the first summer to provide a cancellation signal that is amplified by the cancellation amplifier, and the amplified cancellation signal is inverted and combined with a delayed version of the unified output signal through the second summer.

25. The system of claim 19, the mode selector transmitting a phase modulated signal component of the input signal to the input terminal of the selected power amplifier and an amplitude modulated signal component of the input signal to the supply terminal of the selected power amplifier.

26. The system of claim 19, the mode selector transmitting one of a phase modulated component of the input signal, a constant amplitude signal and no signal to respective input terminals of at least one non-selected power amplifier from the plurality of power amplifiers and a substantially constant amplitude signal to the respective supply terminals of the non-selected power amplifiers.

27. The system of claim 19, each of the plurality of power amplifiers being fabricated *via* an associated fabrication technique, the at least one threshold parameter being selected according to properties of the associated fabrication techniques.

28. A method of amplifying an input signal, the method comprising:

selecting between a plurality of modes of operation for an amplifier system, including at least a first mode of operation associated with a first power amplifier and a second mode of operation associated with a second power amplifier, based on a characteristic of an input signal relative to at least one threshold parameter;

transmitting a phase modulated component of the input signal to an input terminal of the first power amplifier and an amplitude modulated component of the input signal to a supply terminal of the first power amplifier during the first mode of operation, and transmitting the phase modulated component of the input signal to an input terminal of the second power amplifier and the amplitude modulated component of the input signal to a supply terminal of the second power amplifier during the second mode of operation; and

amplifying the input signal *via* the first power amplifier in the first mode of operation and *via* the second power amplifier in the second mode of operation while continuously switching between the plurality of modes of operation to provide an amplified output signal.

29. The method of claim 28, further comprising performing a signal correction on the amplified output signal, the signal correction comprising generating a separate reference signal corresponding to a desired output signal, the reference signal being combined with a portion of the amplified output signal to determine a cancellation signal, the cancellation signal being amplified, inverted and combined with a delayed version of the amplified output signal to generate a final output signal.

30. The method of claim 28, the signal correction being associated with a third mode of operation, such that the signal correction mitigates distortion and out-of-band (OOB) emissions during the first and second modes of operation and provides at least a substantial portion of the amplified output signal during the third mode of operation.

31. The method of claim 30, the at least one threshold parameter representing relative envelope amplitude levels associated with the input signal, such that the first mode of operation is selected when an envelope amplitude level associated with the

input signal is greater than a first threshold parameter, the second mode of operation is selected when the input signal envelope amplitude level falls between the first threshold parameter and a second threshold parameter, and the third mode of operation is selected when the input signal envelope amplitude level falls below the second threshold parameter.